

5(0)

S04/63-4-2-7/39

AUTHOR: Tananayev, I.V., Academician

TITLE: The Utilization of Physical-Chemical Analysis in Analytic Chemistry

PERIODICAL: Khimicheskaya nauka i promyshlennost', 1959, Vol 4, Nr 2,
pp 178-185 (USSR)

ABSTRACT: Physical-chemical analysis has been developed by N.S. Kurnakov and his school [Ref 1]. It is used in the investigations of systems containing metals, salts and organic substances [Ref 2]. It makes use of the optical density, electrode potentials, solubility of the precipitate, etc, in order to analyze a given substance. The investigated properties must be specific, i.e. a change of the property must coincide with a change of the analyzed component. For this purpose isomolar series have been compiled by Ostromyslenskiy in 1910. The results of the investigation are plotted on a diagram which permits conclusions on the course of the process. For the study of light extinction in heterogeneous systems the author introduced the coefficient of the molar extinction of suspensions [Ref 11]. Regular mixing (according to Ul'yanov) is necessary in these investigations. Radioisotopes are used to study the process of coprecipitation with simultaneous measur-

Card 1/3

SOV/63-4-2-7/39

The Utilization of Physical-Chemical Analysis in Analytic Chemistry

ing of the volume of the precipitates [Ref 12]. The precipitate may also be analyzed by thermographic and thermogravimetric methods. The diagrams temperature-time and temperature-weight permit conclusions on the composition of intermediate products. Extraction and chromatography [Ref 13-15], polarography [Ref 18-20] begin being applied in analytic chemistry. The method of electric conductivity is not specific and sensitive enough. The optical method of analysis is already mentioned by Babko [Ref 5]. It is difficult to decipher the data obtained by this method [Ref 6, 23]. It is possible to plot an equilibrium diagram of a given system by this method which gives the percentage relations of the individual components under different operation conditions. The application of light extinction for turbidimetry is limited to the determination of uranium, copper and zinc in the form of ferrocyanides, copper, nickel and cobalt in the form of rubeanates, etc. There are only a small number of diagrams available [Ref 31-34]. The light extinction of a precipitate is dependent on its solubility and its structure. Its composition may be determined without regarding the degree of its dispersion [Ref 36]. The combination of the methods: solubility, electric conductivity and pH measurements is illustrated in the interaction of CdSO_4 with NaOH

Card 2/3

SCV/63-4-2-7/39

The Utilization of Physical-Chemical Analysis in Analytic Chemistry

(Figures 9-13). The study of the formation of basic salts proved the importance of the anion of the precipitated salts. On the base of the formation of mixed ferrocyanides very small quantities of alkali metals may be precipitated, e.g. $2 \cdot 10^{-4}$ g/l rubidium and $1 \cdot 10^{-6}$ g/l cesium

Ref 45, 46.

There are 13 graphs and 49 references, 45 of which are Soviet, 3 French and 1 German.

Card 3/3

SOV/78-4-2-30/40

5(4)

AUTHORS:

Tananayev, I. V., Vorontsova, A. A.

TITLE:

The Interaction Between the Ions MoO_4^{2-} and $\text{C}_2\text{O}_4^{2-}$ in Aqueous Solution (Vzaimodeystviye mezhdu ionami MoO_4^{2-} i $\text{C}_2\text{O}_4^{2-}$ v vodnom rastvore)

PERIODICAL:

Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 2, pp 445-456 (USSR)

ABSTRACT:

The dependence of the interaction between $\text{Na}_2\text{MoO}_4^{2-}$ and $\text{C}_2\text{O}_4^{2-}$ ions on the acidity of the medium was investigated. Iso-molar series and series with a constant Na_2MoO_4 concentration were produced for the determination. Recrystallized preparations of $\text{Na}_2\text{MoO}_4 \cdot 2\text{H}_2\text{O}$, $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$, and $\text{Na}_2\text{C}_2\text{O}_4$ were used as initial materials. The solubility of the systems $\text{Na}_2\text{MoO}_4 - \text{H}_2\text{C}_2\text{O}_4 - \text{H}_2\text{O}$, $\text{Na}_2\text{MoO}_4 - \text{H}_2\text{SO}_4 - \text{H}_2\text{O}$, $\text{Na}_2\text{MoO}_4 - \text{Na}_2\text{C}_2\text{O}_4 - \text{H}_2\text{O}$, $\text{Na}_2\text{C}_2\text{O}_4 - \text{H}_2\text{C}_2\text{O}_4 - \text{H}_2\text{O}$, and $\text{Na}_2\text{MoO}_4 - \text{Na}_x\text{H}_{2-x}\text{C}_2\text{O}_4 - \text{H}_2\text{O}$ was investigated. At the ratio $\text{H}_2\text{C}_2\text{O}_4 : \text{Na}_2\text{MoO}_4 = 1$ a break appears, as can be seen from the

Card 1/3

The Interaction Between the Ions MoO_4^{2-} and $\text{C}_2\text{O}_4^{2-}$ in Aqueous Solution SOV/78-4-2-30/40

course of the solubility curves. The quantity $\Delta\chi$ has negative values throughout the whole course. In the interaction in the systems mentioned, the hydrogen ion-concentration in the solution is of special importance for the progress of the reaction. The interaction of MoO_4^{2-} ions with $\text{C}_2\text{O}_4^{2-}$ ions is favored by the hydrogen ions. The hydrogen ions bind the O^{2-} ions of molybdate in water, and thus the equilibrium is shifted to the right. The formation reaction of the complex ion $[\text{MoO}_3(\text{C}_2\text{O}_4)]^{2-}$ suppresses the formation of isopoly acids.

Therefore, the formation of isopoly acid has no considerable influence upon the interaction between Na_2MoO_4 and $\text{H}_2\text{C}_2\text{O}_4$. In the system $\text{Na}_2\text{MoO}_4\text{-H}_2\text{SO}_4\text{-H}_2\text{O}$, however, the formation of isopoly acid is of primary importance. In systems of the type $\text{Na}_2\text{MoO}_4\text{-Na}_x\text{H}_{2-x}\text{C}_2\text{O}_4\text{-H}_2\text{O}$ the complex ion $[\text{MoO}_3(\text{C}_2\text{O}_4)]^{2-}$ is formed if the values for x range from 0 to 1. There are 14 figures, 6 tables, and 14 references, 4 of which are Soviet.

Card 2/3

The Interaction Between the Ions MoO_4^{2-} and $\text{C}_2\text{O}_4^{2-}$ in Aqueous Solution SOV/78-4-2-30/40

ASSOCIATION: Moskovskiy inzhenerno-fizicheskiy institut (Moscow
~~Engineering and Physics~~ Institute)

SUBMITTED: March 7, 1957

Card 3/3

5(2)

SOV/78-4-2-31/40

AUTHORS: Tananayev, I. V., Lyutaya, M. D.

TITLE: On the Hexanitrito Nickelates of Samarium, Yttrium, and Ytterbium (O geksanitronikeleatakh samariya, ittriya i itterbiya)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 2, pp 457-464 (USSR)

ABSTRACT: The following systems were investigated: $\text{Sm}(\text{NO}_3)_3 \cdot \text{K}_4[\text{Ni}(\text{NO}_2)_6]$, H_2O , $\text{Y}(\text{NO}_3)_3 \cdot \text{K}_4[\text{Ni}(\text{NO}_2)_6] \cdot \text{H}_2\text{O}$, and $\text{Yb}(\text{NO}_3)_3 \cdot \text{K}_4[\text{Ni}(\text{NO}_2)_6] \cdot \text{H}_2\text{O}$. Two solid phases are formed in the first system: $\text{K}_5\text{Sm}[\text{Ni}(\text{NO}_2)_6]_2$ and $\text{K}_{19}\text{Sm}_3[\text{Ni}(\text{NO}_2)_6]_7 \cdot 4\text{H}_2\text{O}$. The solubility curves suggest the gradual formation of the two phases. The thermograms of the solid phases were plotted and are shown in figures 3 and 4. The thermogram of $\text{K}_5\text{Sm}[\text{Ni}(\text{NO}_2)_6]_2$ shows one endothermal effect only in the temperature range of 225-250°. The thermogram of $\text{K}_{19}\text{Sm}_3[\text{Ni}(\text{NO}_2)_6]_7 \cdot 4\text{H}_2\text{O}$ shows two endothermal effects, the first one at 125° and the second one in the temperature range of 230-265°C. The compound

Card 1/3

SOV/78-4-2-31/40

On the Hexanitrito Nickelates of Samarium, Yttrium, and Ytterbium

$K_{19}Sm_3[Ni(NO_2)_6]_7 \cdot 4H_2O$ dissolves more easily in KNO_2 solutions than the respective hexanitrito nickelates of lanthanum, praseodymium, and neodymium. The compound $K_{19}Y_3[Ni(NO_2)_6]_7 \cdot 4H_2O$ is formed in the system $Y(NO_3)_3 - K_4[Ni(NO_2)_6] - H_2O$. The thermogram of this compound shows two endothermal effects, the first one at 120° and the second one at $200^\circ - 250^\circ$. The solubility of $K_{19}Y_3[Ni(NO_2)_6]_7 \cdot 4H_2O$ in KNO_2 solutions is greater than that of the mixed hexanitrito nickelates of lanthanum, praseodymium, neodymium, and samarium. The hexanitrito nickelate of yttrium is soluble in a 4.6 molar solution of KNO_2 , whereas the hexanitrito nickelates of praseodymium, neodymium, lanthanum, and samarium are insoluble in this solutions. The phase $K_{19}Yb_3[Ni(NO_2)_6]_7$ is formed in the system $Yb(NO_3)_3 - K_4[Ni(NO_2)_6] - H_2O$. The thermographic investigations show an endothermal effect in the temperature range of $190 - 230^\circ$. The thermographic investigations of KNO_2 and

Card 2/3

SOV/78-4-2-31/40

On the Hexanitrito Nickelates of Samarium, Yttrium, and Ytterbium

$K_4[Ni(NO_2)_6]$ were carried out and are shown in figures 9 and 10. The results show that the thermograms of KNO_2 and $K_4[Ni(NO_2)_6]$ differ distinctly from all thermograms of the mixed hexanitrito nickelates of rare earths. There are 10 figures, 9 tables, and 3 references, 2 of which are Soviet.

SUBMITTED: September 15, 1958

Card 3/3

5(4)

SOV/78-4-4-23/44

AUTHORS: Kirakosyan, A. K., Tananayev, I. V.

TITLE: Investigation of the Complex Formation of Zirconium in Solution by the Ion Exchange Method (Izucheniye kompleksobrazovaniya tsirkoniya v rastvore s ispol'zovaniyem ionnogo obmena)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 4, pp 852-856 (USSR)

ABSTRACT: The authors investigated the complex formation of zirconium sulphate with oxalic, sulphuric and citric acid by means of the cation exchangers KU-1 and KU-2 under dynamic conditions. The complex ion $[Zr(C_2O_4)_4]^{4-}$ was found in the system $Zr(SO_4)_2 \cdot H_2C_2O_4 \cdot H_2O$. The compound $(Zr_2O_3)C_2O_4$ is formed at a ratio of the components of $H_2C_2O_4 : Zr(SO_4)_2 = 0.5$. The adsorption of zirconium on both cation exchangers in the NH_4^+ , Na- and H-form in dependence of the oxalic acid content is shown in figures 2 and 3. In the system $Zr(SO_4)_2 \cdot H_3Cit \cdot H_2O$ zirconium is completely desorbed at the ratio $H_3Cit : Zr(SO_4)_2 = 3.5$.

Card 1/3

SOV/78-4-4 27/11

Investigation of the Complex Formation of Zirconium in Solution by the Ion Exchange Method

The complex $[\text{Zr}_2(\text{Cit})_7]^{x-}$ is produced. At a ratio of the components of $\text{H}_3\text{Cit} : \text{Zr}(\text{SO}_4)_2 \leq 0.34 - 0.36$ the adsorption of zirconium on the cation exchangers decreases rapidly with increasing ratio of the components. Dizirconyl citrate is probably formed herein. Figure 4 shows the adsorption of zirconium on the cation exchangers in the H^+ -, Na^+ , and NH_4^+ -form in dependence of the concentration of citric acid. In the system $\text{Zr}(\text{SO}_4)_2 - \text{H}_2\text{SO}_4 - \text{H}_2\text{O}$ the zirconyl ion is completely desorbed at a ratio of $\text{H}_2\text{SO}_4 : \text{Zr}(\text{SO}_4)_2 \approx 75$ (concentration of sulphuric acid: 1.5 mols/l). It results from the investigations that direct determination of the composition of the complex ions by the method of ion exchange is only possible with compounds which are in weakly dissociated state present in the solution. There are 5 figures and 7 references, 4 of which are Soviet.

Card 2/3

SOV/78-4-4-23/44

Investigation of the Complex Formation of Zirconium in Solution by the
Ion Exchange Method

ASSOCIATION: Institut obshchey i neorganicheskoy khimii im. N. S. Kurnakova
Akademii nauk SSSR (Institute of General and Inorganic
Chemistry imeni N. S. Kurnakov of the Academy of Sciences,
USSR)

SUBMITTED: January 11, 1958

Card 3/3

5(2)

AUTHORS: Tananayev, I. V., Darchiashvili, T. V.

SOV/78-4-5-14/46

TITLE: Investigation of the Reaction to the Formation of Silver-ferri-cyanides (Izucheniye reaktsii obrazovaniya ferritsianidov serebra)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 5, pp 1028-1035 (USSR)

ABSTRACT: The system $\text{AgNO}_3\text{M}_3[\text{Fe}(\text{CN})_6] \cdot \text{H}_2\text{O}$ ($\text{M} = \text{K}, \text{Rb}$ and Cs) was investigated by means of several physicochemical analyses. The following methods were employed: Determination of solubility, potentiometry, electric conductivity, absorption and volume of precipitations (see tables and figures). In the system $\text{AgNO}_3\text{-K}_3[\text{Fe}(\text{CN})_6] \cdot \text{H}_2\text{O}$ the normal silver ferricyanide $\text{Ag}[\text{Fe}(\text{CN})_6]$ was found to exist. In the system $\text{AgNO}_3\text{-Rb}_3[\text{Fe}(\text{CN})_6] \cdot \text{H}_2\text{O}$ also the mixed salt $\text{RbAg}_2[\text{Fe}(\text{CN})_6]$ forms besides the normal silver ferricyanide. In the system $\text{AgNO}_3\text{-Cs}_3[\text{Fe}(\text{CN})_6] \cdot \text{H}_2\text{O}$ also normal silver-ferricyanide and the mixed salt of the composition $\text{CsAg}_2[\text{Fe}(\text{CN})_6]$ are formed. The formation of

Card 1/2

SOV/73-4-5-14/46

Investigation of the Reaction to the Formation of Silver-ferri-cyanides

mixed salts was determined only by means of measuring the volume of precipitates. In the reaction of silver nitrate a general attenuation of the ability of the alkali metal ions of forming the mixed salt with heavy metal occurs (as compared to ferricyanide). There are 10 figures, 7 tables, and 13 references, 8 of which are Soviet.

SUBMITTED: March 28, 1958

Card 2/2

5(2)

AUTHORS:

Tananayev, I. V., Darchiashvili, T. V.

SOV/78-4-5-15/46

TITLE:

Investigation of the Formation Reaction of Zinc Ferricyanide (Izucheniye reaktsii obrazovaniya ferritsianida tsinka)

PERIODICAL:

Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 5, pp 1036-1042 (USSR)

ABSTRACT:

By determination of solubility and measuring the apparent volume of the precipitate the system $\text{ZnSO}_4\text{-M}_3[\text{Fe}(\text{CN})_6]\text{-H}_2\text{O}$ ($\text{M} = \text{K}, \text{Rb}$ and Cs) was investigated. In the system $\text{ZnSO}_4\text{-K}_3[\text{Fe}(\text{CN})_6]\text{-H}_2\text{O}$ only normal zincferricyanide is formed, which has the composition $\text{Zn}_3[\text{Fe}(\text{CN})_6]$. With a surplus of potassium ferricyanide considerable peptization of zinc ferricyanide occurs. In the system $\text{ZnSO}_4\text{-Rb}_3[\text{Fe}(\text{CN})_6]\text{-H}_2\text{O}$ the double salt $\text{Rb}_3[\text{Fe}(\text{CN})_6]\cdot 6\text{Zn}_3[\text{Fe}(\text{CN})_6]_2$ is formed. Formation of the mixed salt was determined by measuring the apparent volume of the precipitate. The results obtained by analyses are shown by tables 4 and 5 and by figures 5 and 6. In the system $\text{ZnSO}_4\text{-Cs}_3[\text{Fe}(\text{CN})_6]\text{-H}_2\text{O}$ also a mixed salt is formed, which has

Card 1/2

SOV/78-4-5-15/46

Investigation of the Formation Reaction of Zinc Ferrocyanide

the composition $2\text{Cs}_3[\text{Fe}(\text{CN})_6] \cdot 3\text{Zn}_3[\text{Fe}(\text{CN})_6]_2$. By aging this compound goes over into the mixed salt $\text{CsZn}[\text{Fe}(\text{CN})_6]$. Table 7 and figures 8 and 9 show the variation with respect to time of the apparent volume of the precipitate. On the curve of the variation of the apparent volume of the precipitate a maximum occurs in the system $\text{ZnSO}_4 - \text{Cs}_3[\text{Fe}(\text{CN})_6] \cdot \text{H}_2\text{O}$ at $n = 90$ (n = molar ratio $\text{M}_3[\text{Fe}(\text{CN})_6] : \text{ZnSO}_4$ in the initial mixture), which indicates the formation of the mixed salt. The solubility of the precipitate depends on the ionic radius of the alkali metal. The larger this radius, the more insoluble the precipitate. There are 10 figures, 7 tables, and 13 references, 2 of which are Soviet.

SUBMITTED: December 18, 1958

Card 2/2

5(2)

AUTHORS: Tananayev, I. V., Lu Chao-ta

SOV/78-4-9-30/44

TITLE: On the Interaction in the System $\text{Th}(\text{NO}_3)_4 - \text{NaF} - \text{H}_2\text{O}$

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 9, pp 2116-2121 (USSR)

ABSTRACT: The reactions between thorium fluoride and alkali fluorides have been dealt with on numerous occasions (Refs 5 - 8), inter alia by Ye. P. Dergunov and A. G. Bergman (Ref 6) and V. S. Yemel'yanov and A. I. Yevstyukhin (Ref 8). The investigation of the system mentioned in the title was carried out at 25°. The molar ratio $n = \text{NaF} : \text{Th}(\text{NO}_3)_4$ was changed to various values within the range of 1 and 10. The following characteristics were determined: the solubility of the system (Fig 1), its specific electroconductivity (Fig 2), and its pH (Fig 3), the latter by means of the LP-5 pH-meter and, by way of comparison, by means of the PPTV-1 potentiometer. The results are given in table 1. At $n = 3.8$ thorium is completely precipitated in the form of ThF_4 , which reacts when more NaF ($n = 5$) is added and forms the complex salt $\text{NaThF}_5 \cdot \text{H}_2\text{O}$. A radiographical investigation

Card 1/2

On the Interaction in the System
 $\text{Th}(\text{NO}_3)_4 - \text{NaF} - \text{H}_2\text{O}$

SOV/78-4-9-30/44

(Fig 4, Table 2) confirmed the differences in the crystal structures of $\text{ThF}_4 \cdot n\text{H}_2\text{O}$ and $\text{NaThF}_5 \cdot \text{H}_2\text{O}$. These data contradict the data furnished by J. J. Chydenius (Ref 2) and A. Rosenheim (Ref 3). The reason is assumed to be the fact that these research-workers did not wait for the state of equilibrium to set in. The complex salt forms very slowly and the equilibrium comes about after ten hours only. Figure 5 shows the thermogram of $\text{NaThF}_5 \cdot \text{H}_2\text{O}$. There are 5 figures, 2 tables, and 9 references, 3 of which are Soviet.

SUBMITTED: April 30, 1959

Card 2/2

5(2)

AUTHORS: Tananayev, I. V., Lu Chao-ta.

SOV/78-4-9-31/44

TITLE: The Study of the Reaction of Formation of Complex Thorium Fluorides in Solution

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 9, pp 2122-2125 (USSR)

ABSTRACT: The solubility of calcium fluoride in thorium nitrate solutions and solutions of the mixtures of thorium nitrate and sodium fluoride (Tables 1, 2) was investigated. The results suggest the formation of the complex ion ThF^{3+} (Fig 1), while ThF_2^{2+} forms in the case of concentrations of thorium nitrate below 0.1 mol/l only. In the presence of sodium fluoride the solubility of CaF_2 drops (Fig 2). Table 3 and figure 3 represent the dependence of light absorption on the ratio $\text{F}^- : \text{Th}^{4+}$ in the presence of Fe^{3+} and CNS^- . Table 4 lists the optically determined values of the instability constant $K_{\text{ThF}^{3+}}$. According to the solubility method the following values were determined:

Card 1/2

The Study of the Reaction of Formation of
Complex Thorium Fluorides in Solution

SOV/78-4-9-31/44

$K_{\text{ThF}^{3+}} = 1.2 \cdot 10^{-6}$ and $K_{\text{ThF}_2^{2+}} = 1.8 \cdot 10^{-3}$. The optical method
furnished the value $1.3 \cdot 10^{-6}$ for $K_{\text{ThF}^{3+}}$, which is well in
agreement with the other values found. There are 3 figures,
4 tables, and 8 references, 7 of which are Soviet.

SUBMITTED: April 30, 1959

Card 2/2

5(2),5(3)

AUTHORS:

Tananayev, I. V., Vinogradova, A. D.

SOV/75-14-4-20/30

TITLE:

Determination of Aluminum in Solutions Containing Fluorine Ions by Means of 8-Hydroxyquinoline

PERIODICAL:

Zhurnal analiticheskoy khimii, 1959, Vol 14, Nr 4, pp 487-488 (USSR)

ABSTRACT:

Aluminum ions form with fluorine ions little dissociating complex ions. Of these ions $[AlF]^{2+}$ ($K_{[AlF]^{2+}} = 5 \cdot 10^{-6}$) and $[AlF_2]^+$ ($K_{[AlF_2]^+} = 8.7 \cdot 10^{-10}$) are the most stable. Therefore the conventional reagents to aluminum do not react when the solution contains fluorine ions. Table 1 shows the influence of the concentration of fluorine ions on the precipitability of aluminum with 8-hydroxyquinoline. The precipitation was carried out in all cases in an acetate-buffered solution; the fluorine ions were added in the form of NH_4F . The precipitation is no longer quantitative already at the molar ratio $F : Al = 1 : 4$. At the ratio $F : Al = 1 : 1$ no precipitate is formed as the whole aluminum is bound as $[AlF]^{2+}$. Evaporation of the fluorine ions

Card 1/3

Determination of Aluminum in Solutions Containing
Fluorine Ions by Means of 8-Hydroxyquinoline

SOV/75-14-4-20/30

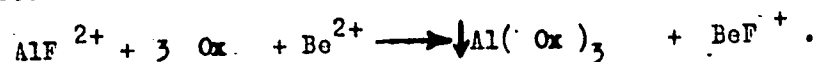
with sulfuric acid or perchloric acid takes very much time. The bonding of the fluorine ions with tartaric acid proved to be successful only in acid solutions in which the determination of aluminum with 8-hydroxy quinoline is impossible. Polyvalent cations are also unsuitable for bonding the fluorine ions in this case as most of them are simultaneously precipitated with the aluminum by 8-hydroxyquinoline. Beryllium forms with fluorine ions the very stable complex $[\text{BeF}]^+$ ($K = 2 \cdot 10^{-6}$), but beryllium does not precipitate under the precipitation conditions of aluminum with 8-hydroxyquinoline. Therefore beryllium ions are suitable for bonding fluorine ions in the precipitation of aluminum. Table 2 lists the results of several aluminum determinations with 8-hydroxyquinoline in the presence of fluorine ions and beryllium ions. The ratio F : Al was 1 : 1. Aluminum is almost quantitatively precipitated by 8-hydroxyquinoline already at the molar ratio of Be : Al = 1 : 2. The precipitation is quantitative at the ratio Be : Al = 1 : 1.

Card 2/3

Determination of Aluminum in Solutions Containing
Fluorine Ions by Means of 8-Hydroxyquinoline

SOV/75-14-4-20/30

In this precipitation obviously the following reaction takes place:



Even large quantities of beryllium in the solution do not disturb the determination of aluminum. There are 2 tables.

ASSOCIATION: Institut obshchey i neorganicheskoy khimii im. N. S. Kurnakova
AN SSSR, Moskva (Institute of General and Inorganic Chemistry,
imeni N. S. Kurnakov, AS USSR, Moscow)

SUBMITTED: November 27, 1958

Card 3/3

TANANAYEV, I. V.

5(0)

SOV/75-14-4-30/30

AUTHOR:

Billimovich, G. N.

TITLE:

Section of Analytical Chemistry of the VIII Mendeleyev Congress on General and Applied Chemistry

PERIODICAL:

Zhurnal analiticheskoy khimii, 1959, Vol 14, Nr 4, pp 511-512 (USSR)

ABSTRACT:

Approximately 300 persons participated in the work of the Department of Analytical Chemistry, among them representatives of various scientific research institutes, higher schools and industrial enterprises in Russia, scientists from China, Bulgaria, the CSR, Poland, Hungary, and Italy. Approximately 70 reports were heard. In his opening speech I. P. Alimarin reported on the achieved results and on modern problems of analytical chemistry. I. V. Tananayev reported on the application of physico-chemical analysis in heterogeneous systems for the solution of a series of problems of analytical chemistry. V. I. Kuznetsov reported on modern aims in the use of organic reagents; A. K. Babko showed at the example of halide and thiocyanate complexes the correlation between the stability of complexes and the position of the corresponding central atoms in the periodic system. V. M. Peshkova and V. M. Bochkova lectured on the stability

Card 1/4

Section of Analytical Chemistry of the
VIII Mendeleyev Congress on General and Applied Chemistry

SOV/75-14-4-30/30

of oximates of Cu, Co, and Ni as depending on the structure of the oxime molecule. V.F. Toropova lectured on the double character of reaction of some compounds in the formation of complexes. The problem of the application of heteropolyacids in analytical chemistry was dealt with in the lectures of Z. F. Shakhova and co-workers, and A. I. Kokorin and N. A. Polotebnova. A large number of lectures dealt with the use of new organic reagents in analysis: A. I. Busev and M. I. Ivanyutin reported on the application of dialkyl and diaryl dithiophosphoric acid for the separation of elements, A. I. Portnov used aryl arsonic acid and aryl phosphinic acid. R. P. Lastovskiy and his co-workers treated some properties of new complexons. The lectures of V. A. Nazarenko, G. G. Shitareva and A. I. Kononenko dealt with the photometric determination of a series of elements using fluorine derivatives. A. I. Cherkesov lectured on the use of halochromation in analytical chemistry. B. M. Dobkina and T. M. Malyutina lectured on the determination of tantalum using differential spectrophotometry. Yu. V. Morachevskiy and I. A. Stolyarova reported on new highly sensitive analysis methods using an ultraviolet microscope. Several lectures dealt with

Card 2/4

Section of Analytical Chemistry of the
VIII Mendeleev Congress on General and Applied Chemistry

SOV/75-14-4-30/30

methodical and theoretical problems of spectrum analysis (N. F. Zakhariy and G. A. Sheynin; E. Ye. Vaynshteyn and co-workers). N. S. Poluektov and M. N. Nikonova treated the perfection of flame photometry. Several lectures dealt with the determination of elements by polarography (S. I. Sinyakova; Z. B. Rozhdestvenskaya and I. A. Yarovoy; Ya. P. Gokhshteyn). New results in using fixed electrodes were reported by I. D. Panchenko and Yu. S. Lyalikov and co-workers. The lecture of N. I. Udal'tsova and P. N. Paley treated the use of amperometric titration with two electrodes in the chemistry of uranium and thorium. M. M. Senyavin showed possibilities of predicting the conditions of chromatographic separation of elements based on their position in the periodic system. T. A. Belyavskaya reported on the use of ion exchange in the investigation of the state of substances in solutions. A. S. Vernidub and V. I. Petrashen' lectured on the chromatographic separation of a series of elements, N. G. Polyanskiy reported on adapting the properties of ion exchanger resins, F. M. Shemyakin and associates reported on the chromatographic proof of sulfanilamide preparations in liquids of the organism. G. L. Starobinets and associates treated

Card 3/4

Analytical Chemistry of the
VIII Mendeleyev Congress on General and Applied Chemistry

SOV/75-14-4-30/30

the application of high polymers in chromatographic analysis. The lecture of A. A. Zhukhovitskiy and N. M. Turkel'taub, G. Shay dealt with gas chromatography. Several lectures treated the use of radioactive isotopes for the chromatographic investigation of complex formation (D. I. Ryabchikov and associates), for the investigation of the co-precipitation mechanism of ions of rare metals with sulfides (N. A. Rudnev) and for determining rare elements by means of isotope dilution (I. P. Alimarin, G. N. Bilimovich). In the field of elementary organic microanalysis the lectures of M. O. Korshun, N. E. Gel'man and V. A. Klimova with associates have to be mentioned, who treated the elaboration of rapid micromethods for the simultaneous determination of several elements from one weighed portion of boron, fluorine and silicon-organic compounds.

Card 4/4

USCOMM-DC 61,608

5(0)

AUTHORS:

Vinogradov, A. P., Alimarin, I. P., SOV/32-25-2-78/78
~~Tananayev, T. V.~~, Dymov, A. M., Terent'yev, A. P.,
 Lur'ye, Yu. Yu., Chernikhov, Yu. A., Korenman, I. M.,
 Kuznetsov, V. I., Gel'man, M. E., Klimova, V. A.,
 Sheveleva, N. S., Chumachenko, M. M., Terent'yeva, Ye. A.
 and others

TITLE:

Mirra Osipovna Korshun (Mirra Osipovna Korshun)

PERIODICAL:

Zavodskaya Laboratoriya, 1959, Vol 25, Nr 2, p 255 (USSR)

ABSTRACT:

Mirra Osipovna Korshun, one of the leading scientists in the field of the microanalysis of organic compounds, died on December 1, 1958. The deceased graduated in 1929 from the II MGU where she had studied chemistry. In 1933 she became head of the analytical group. From 1935 onward she was Head of the Laboratory for Microanalyses at the Institut organicheskoy khimii (Institute of Organic Chemistry) and, in recent years at the Institut elementoorganicheskikh soyedineniy AN SSSR (Institute of ~~Elemental~~ -Organic Compounds, AS USSR). Moreover, she was a Member of the Komissiya po analiticheskoy khimii pri Prezidiume AN SSSR (Commission for Analytical Chemistry

Card 1/2

Mirra Osipovna Korshun

SOV/32-25-2-78/78

With the Presidium of the AS USSR). In 1958 she was appointed Member of the Komitet po mikrokhimicheskim metodam Mezhdunarodnogo soyuza po chistoy i prikladnoy khimii (Committee on Micro-Chemical Methods of the International Association for Pure and Applied Chemistry). M. O. Korshun introduced into organic analysis the principle of "pyrolytic combustion" in the empty tube which makes it possible to determine simultaneously several elements contained in one weighed portion of complicated organic compounds. The school of organic microanalysis founded by the deceased is still being further developed in the USSR in the spirit of her work.

Card 2/2

USCOMM-DC-60750

TANANA YEV, I.V., akademik

Congress of Austrian chemists. Vest. AN SSSR 29 no.1:117-118
Ja '59. (MIRA 12:2)

(Austria--Chemistry--Congresses)

5(2,3)

AUTHORS:

SOV/20-127-3-29/71
Tananayev, I. V., Academician, Seyfer, G. B., Ionova, Ye. A.

TITLE:

The Niobium Analogue of Phosphorus Nitryl Chloride

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 127, Nr 3,
pp 584 - 585 (USSR)

ABSTRACT:

In recent times the interest in high-polymers of inorganic origin rapidly increased. The substance mentioned last in the title also belongs to the group of this kind which, although known for a long time, has not been of great interest, and is now being investigated most eagerly. It was interesting to explain the possibility of the existence of derivatives of a similar type among elements which are analogues of phosphorus. No published data could be found in this connection. The elements of the arsenic group do not fall within this scope, but the elements of the sub-group of vanadium, in a higher valence stage, are analogous to phosphorus, as far as the structure of the outer electronic shell is concerned. Among them niobium was suited best for an introducing investigation. Its higher chloride (which

Card 1/3

The Niobium Analogue of Phosphorus Nitryl Chloride

SOV/20-127-3-29/71

is lacking in vanadium) can be immediately used according to the experimental method which is analogous to that of the production of phosphonitrile chloride (Refs 1-6). The method of reference 4 was easiest for the authors, since it allows an observation of the degree of the reaction course, according to the rate of the HCl separation. The developed product is a finely crystalline yellowy brown powder, resistant in air, but slowly hydrolyzable in water. In benzene, toluene, dichlorethane, CS_2 , CCl_4 and ethylether it is not noticeably soluble. Analytic results are given. The given data show that the original supposition regarding the possibility of the existence of a niobium compound with a composition analogous to that of phosphonitrile chlorides, has been proved. The investigation of their properties is still going on. There are 6 references, of which 1 is Soviet.

Card 2/3

The Niobium Analogue of Phosphorus Nitryl Chloride

SOV/20-127-3-29/71

ASSOCIATION: Institut obshchey i neorganicheskoy khimii im. N. S. Kurnakova
Akademii nauk SSSR (Institute of General and Inorganic Chemistry
imeni N. S. Kurnakov of the Academy of Sciences, USSR)

SUBMITTED: May 15, 1959

Card 3/3

PEREL'MAN, Fanya Moiseyevna, doktor khim.nauk; TANANAYEV, I.V., akademik,
otv.red.; VAGINA, N.S., red.isd-va; VOLKOVA, V.V., tekhn.red.

[Rubidium and cesium] Rubidii i tsezii. Izd.2., dop. i perer. (MIRA 13:9)
Moskva, Izd-vo Akad.nauk SSSR, 1960. 137 p.
(Rubidium) (Cesium)

KORENMAN, Izrail' Mironovich; VINOGRADOV, A.P., akademik, glavnyy red.;
BUSEV, A.I., prof., red.toma; ALIMARIN, I.P., red.; BABKO, A.K.,
red.; VAYNSHTEYN, E.Ye., red.; YERMAKOV, A.N., red.; KUZNETSOV,
V.I., prof., red.; PALEY, P.N., red.; RYABCHIKOV, D.I., red.;
TANANAYEV, I.V., red.; CHERNIKHOV, Yu.A., red.; VOLYNETS, M.P.,
red.izd-va; KASHINA, P.S., tekhn.red.

[Analytical chemistry of thallium] Analiticheskaya khimiya
talliia. Moskva, Izd-vo Akad.nauk SSSR, 1960. 170 p.
(MIRA 14:3)

(Thallium--Analysis)

MIKHEYEVA, Vera Ivanovna; TANANAYEV, I.V., akademik, otv.red.;
TRIFONOV, D.N.. red.izd-va; UL'YANOVA, O.G., tekhn.red.

[Hydrides of transition metals] Gidridy perekhodnykh metallov.
Moskva, Izd-vo Akad.nauk SSSR, 1960. 210 p. (MIRA 13:11)

(Hydrides)

ROTKOVA, S.V., starshiy bibliograf; METSATUN'YAN, I.A., bibliograf;
TANANAYEV, I.V., akademik, otv.red.; TRONEV, V.G., doktor khim.
 nauk, nauchnyy red.; SPIVAKOVA, E.M., red.; PEREL'MAN, F.M.,
 doktor khim.nauk, nauchnyy red.; SPERANSKAYA, Ye.I., kand.khim.
 nauk, nauchnyy red.; DEYCHMAN, E.N., kand.khim.nauk, nauchnyy red.;
 BASHILOVA, N.I., mladshiy nauchn.sotrudnik, nauchnyy red.; BOL'SHA-
 KOVA, N.K., mladshiy nauchn.sotrudnik, nauchnyy red.; KASHINA, R.S.,
 tekhn.red.

[Chemistry of rare elements; bibliographic index of Soviet and
 foreign literature] Khimiia redkikh elementov; bibliograficheski
 ukazatel' otechestvennoi i zarubezhnoi literatury. Moskva, Izd-vo
 Akad.nauk SSSR. No.1. (1951-1954). 1960. 418 p. (MIRA 13:11)

1. Biblioteka Otdeleniya khimicheskikh nauk AN SSSR (for Rotkova).
2. Institut obshchey i neorganicheskoy khimii im. N.S.Kurnakova
 (for Tronev, Perel'man, Speranskaya, Deychman, Bashilova, Bol'shakova).
 (Bibliography--Metals, Rare and minor)

AUTHOR:

Tananayev, I. V., Academician

S/030/60/000/02/012/G40
B008/B014

TITLE:

Congress on Pure and Applied Chemistry

PERIODICAL:

Vestnik Akademii nauk SSSR, 1960, Nr 2, pp 79-81 (USSR)

ABSTRACT:

In this article the author reports on the Seventeenth International Congress on Pure and Applied Chemistry which was held in Munich from August 30 to September 6, 1959. The Congress was devoted to problems of inorganic chemistry. A symposium on applied chemistry and biochemistry took place at the same time. Prior to the Congress, the International Union of Pure and Applied Chemistry held its twentieth conference from August 26 to 29, 1959, on which occasion many problems of organization were discussed and new members were elected to the sections and committees of the International Union. The following representatives of the USSR were unanimously elected: A. P. Vinogradov, Vice President of the Commission of Geochemistry, M. M. Shemyakin, Member of the Section of Organic Chemistry, I. V. Tananayev, Member of the Section of Inorganic Chemistry, and I. P. Alimarin, Second Secretary of the Section of Analytical Chemistry. B. A. Kazanskiy was elected Member of the Bureau of the Council of the International Union. The Congress was attended by 2000 scientists. 530 lectures were delivered, 89 of which on the

Card 1/2

Congress on Pure and Applied Chemistry

S/030/60/000/02/012/040
B008/B014

Symposium on Biochemistry and 61 on the Symposium on Applied Chemistry. Mention is made of the following lectures by Soviet delegates: O. A. Reutov spoke about the formation mechanisms of the metal - carbon compound and the reactivity of organometallic compounds. I. R. Krichevskiy spoke about the thermodynamics of systems at high and excess pressures. Ya. I. Gerasimov's lecture dealt with the thermodynamics of antimonides of iron and cobalt. Yu. K. Delimarskiy's lecture was devoted to the polarography of fused salts. N. P. Luzhnaya showed the phase diagram of the ternary system $\text{CaO-P}_2\text{O}_5\text{-SiO}_2$ in the form of a steric model. L. K. Liyepinya reported on the kinetics of exchange reactions. The author of the article under review spoke about the composition of ferrocyanides of the rare-earth metals scandium and yttrium.

Card 2/2

5-2620

68109
SOV/78-5-1-11/45

AUTHORS:

Tananayev, I. V., Avduyevskaya, K. A.

TITLE:

On the Fluorogermanates of Some Bivalent Metals

PERIODICAL:

Zhurnal neorganicheskoy khimii, 1960, Vol 5, Nr 1, pp 63 - 67
(USSR)

ABSTRACT:

The authors produced the salts $\text{MeGeF}_6 \cdot 6\text{H}_2\text{O}$ (Me = Mg, Zn, Cd, Fe, Co, Ni, Mn) and $\text{MeGeF}_6 \cdot 2\text{H}_2\text{O}$ (Me = Sr, Ca) (Table), and moreover, the hexafluorosilicates of Mg, Cd, Co, Ni, and Sr for the purpose of comparing the thermal stability. Figure 1 shows the microphotographs of some characteristic crystals of the fluorogermanates (Co, Mn, Cd). The structural investigation of the Co salt revealed a similarity with the structure of $[\text{Ni}(\text{H}_2\text{O})_6][\text{SnCl}_6]$, so that the more correct way of writing the hexahydrate formula would be: $[\text{Me}(\text{H}_2\text{O})_6] \cdot [\text{GeF}_6]$. Thermograms of all compounds were plotted (Figs 2-10). These are very similar to one another and show the stepwise discharge of water and eventually, the decomposition into MeF_2 and GeF_4 . The thermogram

Card 1/2

On the Fluorogermanates of Some Bivalent Metals

68109
SOV/78-5-1-11/45

of the Fe compound (Fig 3) differs somewhat, because oxidation of Fe^{II} occurs additionally. The thermograms of $\text{CaSiF}_6 \cdot 2\text{H}_2\text{O}$ and $\text{CaGeF}_6 \cdot 2\text{H}_2\text{O}$ are likewise very similar to one another; the fluorosilicate decomposition, however, occurs at a lower temperature. The same holds for the hexahydrates of the fluorosilicates of Mg (Fig 11), Cd, Ni, Ca, and Sr. The hexafluorogermanates are thermally more stable than the corresponding silicon compounds. There are 11 figures, 1 table, and 9 references, 5 of which are Soviet.

SUBMITTED: May 22, 1959

Card 2/2

SOV/78-5-1-14/45

5 (2)
AUTHORS:

Tananayev, I. V., Darchiashvili, T. V.

TITLE:

Formation Reaction of Mixed Ferricyanides of Nickel

PERIODICAL:

Zhurnal neorganicheskoy khimii, 1960, Vol 5, Nr 1, pp 80- 87
(USSR)

ABSTRACT:

In a brief survey of publications (Refs 1-11) with the mention of N. G. Chovnyk and N. N. Kuz'mina (Ref 10) the authors point out contradictions found concerning data of the nickel ferricyanide composition. They report on the investigation of the systems $\text{NiSO}_4 - \text{M}_3[\text{Fe}(\text{CN})_6] - \text{H}_2\text{O}$, wherein $\text{M} = \text{K}, \text{Rb}, \text{Cs}$. The solubility method was applied, and furthermore, the apparent volumes of the precipitates were measured. Data obtained are shown in figures 1-12 and tables 1-7. Normal nickel ferricyanide $\text{Ni}_3[\text{Fe}(\text{CN})_6]_2$ is produced in the system with $\text{K}_3[\text{Fe}(\text{CN})_6]$ (and probably also with the corresponding Na- and Li salt). The reaction of Ni^{2+} with $\text{Rb}_3[\text{Fe}(\text{CN})_6]$ leads to the formation of salt $6\text{Ni}_3[\text{Fe}(\text{CN})_6]_2 \cdot \text{Rb}_3[\text{Fe}(\text{CN})_6]$ which changes over to the

Card 1/2

Formation Reaction of Mixed Ferricyanides of Nickel SOV/78-5-1-14/45

salt on excess of rubidium ferricyanide:
 $2\text{Ni}_3[\text{Fe}(\text{CN})_6]_2 \cdot \text{Rb}_3[\text{Fe}(\text{CN})_6]$. In the reaction of nickel sulfate
 with $\text{Cs}_3[\text{Fe}(\text{CN})_6]$, the analog salt $6\text{Ni}_3[\text{Fe}(\text{CN})_6]_2 \cdot 4\text{Cs}_3[\text{Fe}(\text{CN})_6]$
 is produced first, which changes over to $\text{CsNi}[\text{Fe}(\text{CN})_6]$ on ex-
 cess of ferricyanide. Unlike the ferricyanides of zinc, normal
 ferricyanides of nickel and the mixed salts exhibit a much
 lower solubility. There are 12 figures, 7 tables, and 13 ref-
 erences, 3 of which are Soviet.

SUBMITTED: January 25, 1958

Card 2/2

5(a) 5.2400(B)

68226
S/078/60/005/02/014/045
B004/B016

AUTHORS: Tananayev, I. V., Vinogradova, A. D.

TITLE: On Composition and Stability of Complex Fluoferrates and Fluoberyllates in Solution on the Basis of Data of the Solubility Method

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol 5, Nr 2, pp 321-326 (USSR)

ABSTRACT: In the paper of reference 1, the authors investigated the solubility in the system $\text{CaF}_2 - \text{AlX}_3 - \text{H}_2\text{O}$ ($\text{X} = \text{anion}$), and detected the formation of the ion AlF_2^+ . They report now on the solubility of CaF_2 in solutions of salts of beryllium and trivalent iron according to the same method. The Fe solutions contained 0.01 mol/l excess of the corresponding mineral acid to prevent the precipitation of basic salts. System $\text{CaF}_2 - \text{Fe}(\text{NO}_3)_3 - \text{H}_2\text{O}$ (Table 1, Fig 1): The solubility of CaF_2 increases considerably in the presence of the Fe salt. Mainly, the FeF_2^+ ion is formed whereas the concentration of FeF_3 and $[\text{FeF}_6]^{3-}$ remains

Card 1/3

68226

On Composition and Stability of Complex Fluor-
ferrates and Fluoberyllates in Solution on the
Basis of Data of the Solubility Method

S/078/60/005/02/014/045
B004/B016

low. System $\text{CaF}_2 - \text{FeCl}_3 - \text{H}_2\text{O}$ (Table 2, Fig 2): The solubility of CaF_2 is lower than in the one described previously owing to the lower dissociation of FeCl_3 . System $\text{CaF}_2 - \text{Fe}_2(\text{SO}_4)_3 - \text{H}_2\text{O}$: This system could only be investigated in a very narrow range of concentration since gypsum precipitates in iron sulfate concentrations of more than 0.01 mol/l. System $\text{CaF}_2 - \text{Fe}(\text{NO}_3)_3 - \text{NaF} - \text{H}_2\text{O}$ (Table 3, Fig 3): Increasing additions of NaF reduce the solubility of CaF_2 . System $\text{CaF}_2 - \text{Fe}(\text{NO}_3)_3 - \text{NH}_4\text{SCN} - \text{H}_2\text{O}$: The addition of NH_4SCN reduces the solubility of CaF_2 owing to the formation of the less dissociated ion FeSCN^{2+} . System $\text{CaF}_2 - \text{Be}(\text{NO}_3)_2 - \text{NaF}(\text{BeF}_2) - \text{H}_2\text{O}$ (Tables 5,6, Figs 5,6): In these two systems, the solubility of CaF_2 decreases with increasing content of BeF_2 or NaF in the solution. The reaction

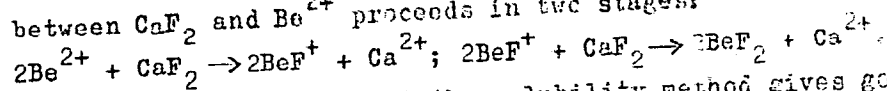
Card 2/3

On Composition and Stability of Complex Fluorides and Fluoberyllates in Solution on the Basis of Data of the Solubility Method

68226

S/072/60/005/02/014/045
B004/B016

between CaF_2 and Be^{2+} proceeds in two stages:



The authors point out that the solubility method gives good results when investigating complex formations in solutions. Especially informative is the introduction of another addendum (BeF₂, NaF) into the system since by means of this the gradual complex formation may be investigated. The following instability constants were determined: $K_{\text{Fe}_2\text{F}_2^{2+}} \approx 1 \cdot 10^{-5}$; $K_{\text{FeF}_2^+} = 1-2 \cdot 10^{-9}$;

$K_{\text{BeF}^+} = 2.3 \cdot 10^{-6}$; $K_{\text{BeF}_2} = 4 \cdot 10^{-3}$. The solutions of the salts of trivalent Fe dissolve the difficultly soluble fluorides just as well as the solutions of the salts of Al and Be. The authors quote E. N. Deychman, A. K. Babko, and K. Ye. Kleyner. There are 6 figures, 6 tables, and 9 references, 5 of which are Soviet.

SUBMITTED:
Card 3/3

November 29, 1958

AUTHORS:

Tananayev, I. V., Bokmel'der, M. Ya.

S/078/60/005/03/034/048
B004/B005

TITLE:

Investigation of the Formation Reaction of Cerium(III) Hydroxide

PERIODICAL:

Zhurnal neorganicheskoy khimii, 1960, Vol 5, Nr 3, pp 701-707 (USSR)

ABSTRACT:

In the present paper the authors investigate the interaction between diluted solutions (0.025 gram-ion/l) of cerium(III) sulfate and -chloride with soda lye. The solubility method was used, and the pH, the electrical conductivity, and the apparent precipitation volume were measured. Because of the easy oxidisability of $\text{Ce}(\text{OH})_3$, the experiments were carried out in nitrogen atmosphere. Table 1 and figure 1 show the solubility in the system $\text{Ce}_2(\text{SO}_4)_3 - \text{NaOH} - \text{H}_2\text{O}$ at 25° , figure 2 the variation of the precipitate composition, table 2 and figure 3 the variation of conductivity, and figure 4 the variation of pH. The unstable basic salt $\text{Ce}_3(\text{OH})_5(\text{SO}_4)_2$ forms first, which on further addition of NaOH passes over into the stable $\text{Ce}_2(\text{OH})_4\text{SO}_4$ or $4\text{Ce}(\text{OH})_3 \cdot \text{Ce}_2(\text{SO}_4)_3$ in which form the Ce^{3+} is precipitated from the solution. Further addition of NaOH leads to a formation of $\text{Ce}(\text{OH})_3$ which, however, retains small amounts of SO_4^{2-} . For the system $\text{CeCl}_3 - \text{NaOH} - \text{H}_2\text{O}$, the same data are given in table 3

Card 1/2

Investigation of the Formation Reaction of Cerium(III) Hydroxide S678/60/005/03/034/048
B004/B005

(solubility), figure 5 (composition of the liquid phase), figure 6 (composition of the bottom phase), table 4, figure 7 (conductivity), and figure 8 (pH). In this system, the unstable colloidal $\text{Ce}_2(\text{OH})_5\text{Cl}$ forms first, which on further addition of NaOH passes over into $\text{Ce}(\text{OH})_3$. A carrying-along of excess NaOH into the precipitate was not observed in either of the two systems. The authors make comparisons with the basic neodymium and aluminum sulfates. The measurement of the apparent precipitation volumes caused a noticeable oxidation so that no findings could be made. There are 8 figures, 4 tables, and 13 references, 8 of which are Soviet.

ASSOCIATION: Moskovskiy inzhenerno-fizicheskiy institut Kafedra khimii
(Moscow Institute of Technical Physics, Chair of Chemistry)

SUBMITTED: November 29, 1958

Card 2/2

5.4120
5.2620
AUTHORS:

Vorontsova, A. A., Tananayev, I. V.

69031

S/078/60/005/04/035/040
B004/B016

TITLE:

On the Interaction Between Na_2WO_4 and $\text{C}_2\text{O}_4^{2-}$ Ions in Aqueous Solution

PERIODICAL:

Zhurnal neorganicheskoy khimii, 1960, Vol 5, Nr 4, pp 964 - 968 (USSR)

ABSTRACT:

The authors investigated the dependence of the interaction between Na_2WO_4 and $\text{C}_2\text{O}_4^{2-}$ ions on the acidity of the solution by means of the method of the electric conductivity (audio oscillator LP-5-potentiometer). The system $\text{Na}_2\text{WO}_4 - \text{H}_2\text{C}_2\text{O}_4(\text{NaHC}_2\text{O}_4, \text{Na}_2\text{C}_2\text{O}_4) - \text{H}_2\text{O}$ was investigated. To determine the deviation of the conductivity from the additivity, the dependence of the conductivity of the individual components on the concentration was measured in the first place (Fig 1). In the system $\text{Na}_2\text{WO}_4 - \text{H}_2\text{C}_2\text{O}_4 - \text{H}_2\text{O}$ three isomolar mixtures with 0.05, 0.1, and 0.25 mole/l were investigated (Table). In all three series the same behavior was found. Figure 2 indicates for the series 0.1 mole/l, that both κ_1 and $\Delta\kappa$ possess a pronounced minimum

Card 1/3

On the Interaction Between Na_2WO_4 and $\text{C}_2\text{O}_4^{2-}$ Ions in Aqueous Solution

69031

S/078/60/005/04/035/040
B004/B016

at $n = 1.5$ ($n = \text{C}_2\text{O}_4/\text{Na}_2\text{WO}_4$). The same behavior was found in the series with constant concentration of Na_2WO_4 (Fig 3). The pH-measurements, however, indicate in the isomolar series a slow drop of pH at $n = 0.5$, then up to $1.5 - 2$ a rapid drop and at $n > 2$ again a slow drop (Fig 4). The indistinct point of inflection of the curve may be assigned most probably to $n = 1$. At constant concentration of Na_2WO_4 pH drops linearly with increasing n (Fig 5). ✓

In the systems $\text{Na}_2\text{WO}_4 - \text{Na}_2\text{C}_2\text{O}_4 - \text{H}_2\text{O}$ (Figs 6,7) and $\text{Na}_2\text{WO}_4 - \text{NaHC}_2\text{O}_4 - \text{H}_2\text{O}$ (Fig 8) only linear dependences were found, so that no chemical reaction of Na_2WO_4 with the two oxalates could be detected in these systems. For the system with free oxalic acid the authors assume the formation of complex compounds according to the equation $2\text{Na}_2\text{WO}_4 + 3\text{H}_2\text{C}_2\text{O}_4 \rightarrow \text{Na}_4\text{W}_2\text{O}_5(\text{C}_2\text{O}_4)_3 + 3\text{H}_2\text{O}$. The acid reaction of the solution may be caused by a partial hydrolysis of this complex. The authors quote a paper by G. S. Savchenko (Ref 5). There are 8 figures, 1 table, and 6 references, 2 of which are Soviet.

Card 2/3

69031

On the Interaction Between Na_2WO_4 and $\text{C}_2\text{O}_4^{2-}$ Ions in Aqueous Solution S/078/60/005/04/035/040
B004/B016

ASSOCIATION: Moskovskiy inzhenerno-fizicheskiy institut Kafedra khimii
(Moscow Institute of Physics and Engineering, Chair of
Chemistry)

SUBMITTED: January 27, 1959

Card 3/3

S/078/60/005/05/36/037
B004/B016

AUTHORS: Tananayev, I. V., Luzhnaya, N. P.

TITLE: The XVII Congress on Pure and Applied Chemistry

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 5, pp. 1178 - 1183

TEXT: The XVII Congress of the IUPAC (International Union of Pure and Applied Chemistry) took place in Munich from July 30 to September 6, 1959. It was preceded by the XX Conference of the IUPAC (August 26-29, 1959) which was attended by a Soviet delegation consisting of B. A. Kazanskiy (re-elected as representative of the USSR at the Bureau of the IUPAC), M. M. Shemyakin (elected as a member of the Section of Organic Chemistry), A. P. Vinogradov (elected as Deputy Chairman of the Section of Geochemistry), I. V. Tananayev (elected as a member of the Section of Inorganic Chemistry), Ya. I. Gerasimov, O. A. Reutov, and G. I. Bakhmaninov. Further, I. P. Alimarin was appointed Second Secretary of the Section of Analytical Chemistry. About 2200 delegates attended the Congress. In a plenary session O. A. Reutov delivered a lecture: "The Mechanism of the Formation of Metal-Carbon Bond and Some Considerations on the Reactivity of Organometallic Compounds of Heavy Metals". Concerning the work of the sections the

Card 1/2

The XVII Congress on Pure and Applied Chemistry

S/078/60/005/05/36/037
B004/B016

following is reported: Section I (Organometallic Compounds): 66 lectures. A report on the work of this section will be given later on. Section II (Chemistry of Hydrides): 36 lectures. Section III (Chemistry of Actinides and Lanthanides): 51 lectures, among them D. I. Ryabchikov: "Complex Formation of Rare Earths", and I. V. Tananayev: "On the Composition of Ferrous Cyanides of the Rare Earths Scandium and Yttrium". Section IV (Fluorine Chemistry): 21 lectures. Section V (Preparation of Pure Metals): 16 lectures. Section VI (Non-aqueous Solvents): 16 lectures. Section VII (Homogeneous and Heterogeneous Gas Equilibria): 9 lectures. Section VIII (Semiconductors and Non-metallic Compounds): 24 lectures. Section IX (Ternary Oxides and Sulfides): 35 lectures, among them N. P. Luzhnaya: "The Phase Diagram of the Ternary System $\text{CaO} - \text{P}_2\text{O}_5 - \text{SiO}_2$ ". Section X (Various Communications): 101 lectures, among them Yu. K. Delimarskiy (Kiyev): "Polarography of Melted Salts", L. K. Lepin' (Riga): "On the Kinetics of Exchange Reactions Between Metals and Water", and Ya. I. Gerasimov: "Thermodynamic Properties of Iron- and Cobalt Antimonides". Reactions at ultrahigh pressures were dealt with at a symposium. I. R. Krichevskiy reported on: "Thermodynamics of Systems at High and Superhigh Pressures".

Card 2/2

5.5100

1153, 1273, 1350

87334

S/078/60/005/011/021/025/XX
B004/B060

AUTHORS: Savchenko, G. S., Tananayev, I. V.

TITLE: Interaction of Aluminum Ions With Ethylene Diamine
Tetraacetic Acid and Its Salts in Aqueous Solution

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 11,
pp. 2593 - 2597

TEXT: It is stated that most studies on complex compounds are concerned with the determination of the instability constants. By contrast, the authors examined the interaction between Al^{3+} and ethylene diamine tetraacetic acid (EDTA) and its sodium salts by the physicochemical method, with a view to establishing the limits of the existence of individual complexes and the conditions of their mutual conversion. These data are said to be important both for the theory of the complex problem and for the practical use of complexons. The study was conducted with systems of the general type $Me^{3+} - Y^{4-} - H^+ - H_2O$ (the EDTA radical being indicated by Y^{4-}). The components were $AlCl_3$ and EDTA saturated to different

Card 1/8

Interaction of Aluminum Ions With Ethylene
Diamine Tetraacetic Acid and Its Salts in
Aqueous Solution

S/078/60/005/011/021/025/XX
B004/B060

degrees: H_4Y ; NaH_3Y ; Na_2H_2Y ; Na_3HY ; and Na_4Y . Five systems were thus examined by way of isomolar series and series with a constant cation concentration. Measurements (after 12 - 14 hours of stirring) included pH, specific conductivity κ , optical density D, in some cases also the mixing heat ΔH . Fig. 1 shows the change of the H^+ concentration in 0.05 mole/l isomeric series as a function of the molar ratio $n = Na_x H_{4-x} Y : AlCl_3$ for all five systems. While curves 1 - 4 exhibit a maximum near $n = 1$, two breaks appear on curve 5 (corresponding to the system with Na_4Y), which are interpreted as the formation of complex ions $[AlY]^-$ and $[Al(OH)Y]^{2-}$. The maximum of the curves 1 - 4 for $n \sim 1$ is accompanied by the formation of a precipitate, which was found to be H_4Y . In the reaction of Al^{3+} with H_4Y and their acid salts, the concentration of H^+ ions rises rapidly at first. Thereupon, however, the H^+ ions start competing with the Al^{3+} ions, and H_4Y is salted out. This is illus-

Card 2/8

87334

Interaction of Aluminum Ions With Ethylene
Diamine Tetraacetic Acid and Its Salts in
Aqueous Solution

S/078/60/005/011/021/025/XX
B004/B060

trated in Fig. 3 for the process in the system $\text{AlCl}_3 - \text{Na}_2\text{H}_2\text{Y} - \text{H}_2\text{O}$ (for $\text{AlCl}_3 = 0.01$ mole/l). To $n = 1$ there corresponds a maximum of $[\text{H}^+]$ and κ . The hatched zone shows the weight of the precipitate. The latter forms only at $n > 1$. The decrease of the amount of precipitate with a further increase of n is caused by secondary reactions: formation of $[\text{Al}(\text{H}_{4-x}\text{Y})]^{(3-x)}$ ions. The displacement of Al^{3+} ions from H_2Y^{2-} is thus reversible. As is shown by Fig. 4, the system $\text{AlCl}_3 - \text{Na}_4\text{Y} - \text{H}_2\text{O}$ exhibits two breaks on the curves of pH and ΔH for $n = 1$ and $n = 2$. The first break corresponds to the reaction $\text{Na}_4\text{Y} + \text{AlCl}_3 \longrightarrow \text{Na}[\text{AlY}] + 3\text{NaCl}$, and after prolonged standing a conversion takes place corresponding to $2\text{Na}[\text{AlY}] + 2\text{H}_2\text{O} \longrightarrow (\text{AlOH})_2\text{Y} + \text{Na}_2\text{H}_2\text{Y}$. The second break displays the reaction $\text{Na}[\text{AlY}] + \text{Na}_4\text{Y} + \text{H}_2\text{O} \longrightarrow \text{Na}_2[\text{Al}(\text{OH})\text{Y}] + \text{Na}_3\text{HY}$. The acid salt $\text{H}[\text{AlY}]$ ($K_{\text{H}} = 2 \cdot 10^{-3}$) is formed quantitatively in an acid medium. By contrast, the ion $[\text{AlY}]^-$ ($\text{pK} = 15.7$) is formed primarily at a high pH. The

Card 3/8

87334

Interaction of Aluminum Ions With Ethylene Diamine Tetraacetic Acid and Its Salts in Aqueous Solution S/078/60/005/011/021/025/XX
B004/B060

acid salt displays two forms corresponding to the reaction $AlHY \rightleftharpoons H[AlY]$ whose equilibrium is shifted as a function of pH. There are 4 figures and 4 Soviet references.

SUBMITTED: February 12, 1960

Card 4/8

87334
S/078/60/005/011/021/025/XX
B004/B060

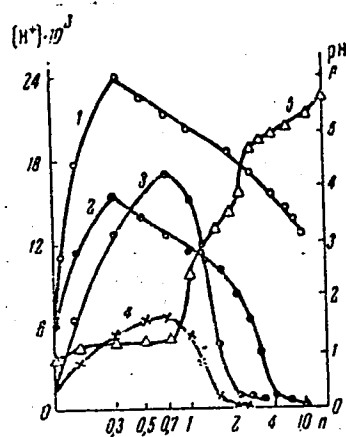


Рис. 1

Card 5/8

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S/078/60/005/011/021/025/XX
B004/B060

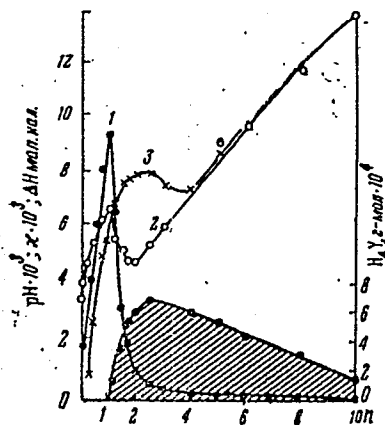
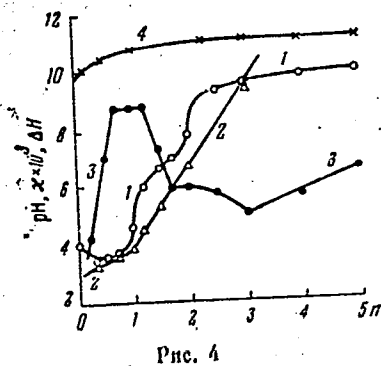


Рис. 3

Card 6/8

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S/078/60/005/011/021/025/XX
B004/B060



Card 7/8

87334

S/078/60/005/011/021/025/XX
B004/B060

Legend to Fig. 1. 1: $\text{AlCl}_3 - \text{H}_4\text{Y} - \text{H}_2\text{O}$; 2: $\text{AlCl}_3 - \text{NaH}_3\text{Y} - \text{H}_2\text{O}$;
3: $\text{AlCl}_3 - \text{Na}_2\text{H}_2\text{Y} - \text{H}_2\text{O}$; 4: $\text{AlCl}_3 - \text{Na}_3\text{HY} - \text{H}_2\text{O}$; 5: $\text{AlCl}_3 - \text{Na}_4\text{Y} - \text{H}_2\text{O}$

Legend to Fig. 3. 1: $[\text{H}^+] \cdot 10^3$; 2: $\kappa \cdot 10^3$; 3: ΔH ; 4: weight of $\text{H}_4\text{Y} \cdot 10^4$
precipitate.

Legend to Fig. 4. 1: pH; 2: κ ; 3: ΔH ; 4: pH in solutions of Na_4Y at
concentrations corresponding to the n-values of the systems.

Card 8/8.

5.5400

77740
SOV/75-15-1-2/29

AUTHORS: Ponomarev, V. D., Tananayev, I. V.

TITLE: Potentiometric Study of the Reaction of Mixed Alkali Metal and Uranyl Ferrocyanides

PERIODICAL: Zhurnal analiticheskoy khimii, 1960, Vol 15, Nr 1, pp 10-15 (USSR)

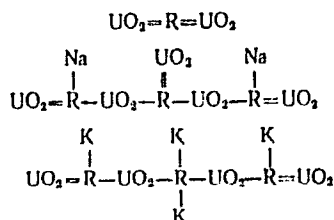
ABSTRACT: Reaction of the System $UO_2^{2+} - M_4[Fe(CN)_6] - H_2O$, where $M = Li, K, Na, Rb,$ and Cs , was studied by measuring the redox potentials. LP-5 potentiometer with platinum and saturated calomel electrodes was used. Approximately 0.1-0.2 M solutions of $M_4R, M_3R,$ and $UO_2(NO_3)_2$ were used. An aqueous solution (50 ml), containing 10 ml of uranyl nitrate and 0.3 ml of ferrocyanide was titrated potentiometrically with K, Na, or Li ferrocyanides, in some cases in the presence of equimolar amounts of: RbCl or CsCl; KCl, RbCl, or CsCl; NaCl, KCl, RbCl, or CsCl. Results of the 12 titrations are shown in Fig. 1, 2, and 3. It was found that the character of the redox potential

Card 1/6

Potentiometric Study of the Reaction of
Mixed Alkali Metal and Uranyl Ferrocyano-

77740
SOV/75-15-1-2/29

curves and the position of the equivalent point (inflection) of the investigated system depend on the alkali metal present in solution during titration. In the presence of lithium ferrocyano-, a normal uranyl cyanide, $(\text{UO}_2)_2[\text{Fe}(\text{CN})_6]$, is formed. In the presence of other alkali metals, mixed ferrocyano- of the following general formula are formed: $n(\text{UO}_2)_2 \cdot (n-1)\text{M}_h\text{R}$. It was suggested that the mixed ferrocyano-ides be considered as polynuclear molecules of the polymer type.

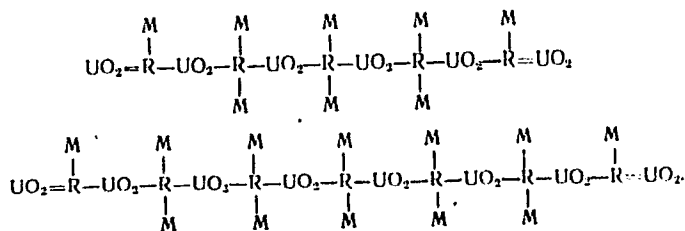


Card 2/6

Potentiometric Study of the Reaction of
Mixed Alkali Metal and Uranyl Ferrocyanides

77740

SOV/75-15-1-2/29



(M is Rb or Cs)

Complexes containing large quantities of alkali metals are formed in an excess of alkali metal ions. An excess of chlorides of the alkali metals leads to the formation of mixed uranyl ferrocyanides: $4(UO_2)_2[Fe(CN)_6] \cdot 3M_4[Fe(CN)_6]$. There are 3 figures; and 10 references, 1 Indian, 9 Soviet.

ASSOCIATION: Moscow Institute of Physics and Engineering (Moskovskiy inzhenerno-fizicheskiy institut)

SUBMITTED: January 3, 1959

Card 3/6

77740, SOV/75-15-1-2/29

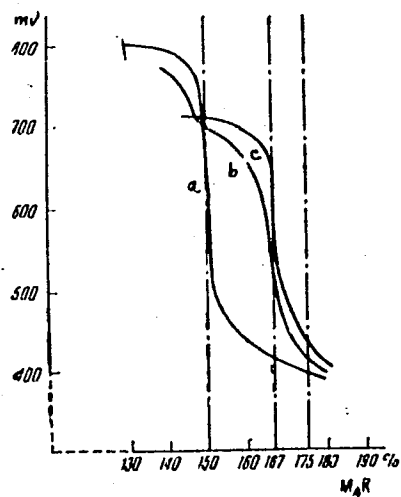


Fig. 1. Change of redox potential on titrating $\text{UO}_2(\text{NO}_3)_2$ solution with: (a) K_4R ; (b) $\text{K}_4\text{R} + \text{RbCl}$; (c) $\text{K}_4\text{R} + \text{CsCl}$.

Card 4/6

77740, SOV/75-15-1-2/29

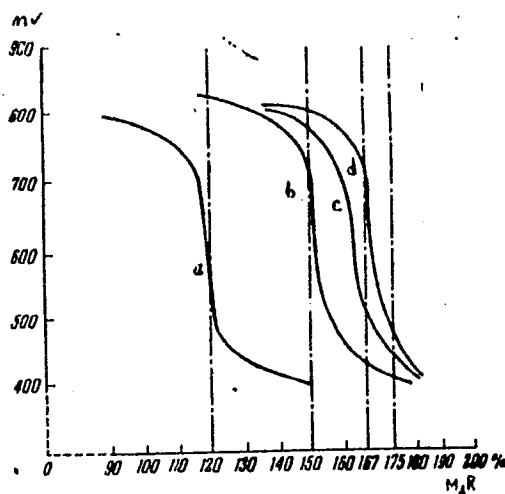


Fig. 2. Change of oxidation-reduction potential on titration of $\text{UO}_2(\text{NO}_3)_2$ solution with: (a) Na_4R ; (b) $\text{Na}_4\text{R} + \text{KCl}$; (c) $\text{Na}_4\text{R} + \text{RbCl}$; (d) $\text{Na}_4\text{R} + \text{CsCl}$.

Card 5/6

77740, SOV/75-15-1-2/29

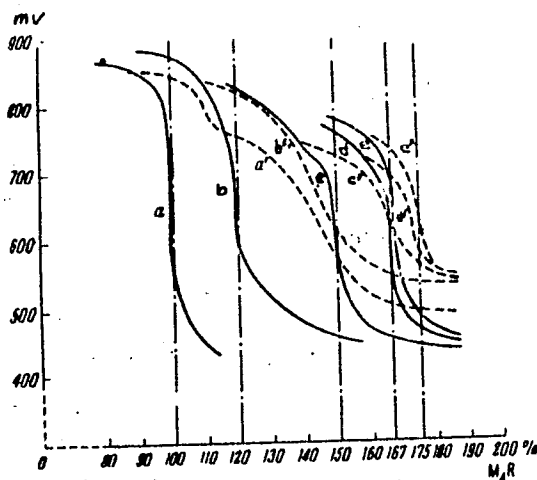


Fig. 3. Change of oxidation-reduction potential on titration of $UO_2(NO_3)_2$ with: (a) Li_4R ; (a') $Li_4R + LiCl$; (b and b') $Li_4R + NaCl$; (c and c') $Li_4R + KCl$; (d and d') $Li_4R + RbCl$; (e and e') $Li_4R + CsCl$.

Card 6/6

TANANAYEV, I.V., akademik; DZHURINSKIY, B.F.

Spectrophotometric study of chloride complexes of cobalt in fused salts. Dokl. AN SSSR 134 no.6:1374-1377 O '60. (MIRA 13:10)

1. Institut obshchey i neorganicheskoy khimii im. N.S.Kurnakova.
(Cobalt compounds)

TANANAYEV, I.V., akademik; DZHMURINSKIY, B.F.

Interactions in the systems $\text{Co}(\text{NO}_3)_2\text{-KBr}$, $\text{Co}(\text{NO}_3)_2\text{-KI}$ in a nitrate
melt. Dokl. AN SSSR 135 no.1:94-97 1960. (MIRA 13:11)

1. Institut obshchey i neorganicheskoy khimii im. N.S.Kurnakova.
(Cobalt nitrate) (Potassium bromide) (Potassium iodide)

TANANAYEV, I. V.

"Reactions in the synthesis of organo-element and some inorganic polymers"

paper submitted for the Symposium on Inorganic Polymers, Nottingham, England,
18-21 Jul 1961.

Institute of General and Inorganic Chemistry imeni N. S. Kurnakov; Active
Member, Academy of Sciences USSR.

TANANAYEV, I.V.; DEYCHMAN, E.N.

Properties of uranium oxyfluoride in solutions. Radiokhimiia
3 no.6:712-718 '61. (MIRA 14:12)
(Uranium oxyfluoride)

KUDRYAVTSEV, Aleksandr Andreyevich; STEPANOV, M.N., starshiy nauchnyy sotr.,
kand. tekhn. nauk, retsenzent; SHIDLOVSKIY, A.A., doktor tekhn.
nauk, prof., retsenzent; TANANAYEV, I.V., akademik, prof., doktor
khim. nauk, red.; PLETNEVA, N.B., red.; ALAVERDOV, Ya.G., red. izd-
va; VORONINA, R.K., tekhn. red.

[Chemistry and technology of selenium and tellurium] Khimiia i
tekhnologiya selena i tellura. Pod red. I.V.Tananaeva. Moskva,
Gos. izd-vo "Vysshaya shkola," 1961. 284 p. (MIRA 14:10)

1. Deystvitel'nyy chlen AN SSSR (for Tananayev).
(Selenium) (Tellurium)

TANANAYEV, I.V.; SHCHEGLOVA, Ye, P.

Precipitation of beryllium by an alkali in the presence of fluorine ions. Zhur.neorg.khim. 6 no.5:1219-1222 My '61. (MIRA 14:4)

(Beryllium compounds)

S/078/61/006/008/004/018
B121/B203

AUTHORS: Kirakosyan, A. K., Tananayev, I. V.

TITLE: Study of the reaction of zirconium oxychloride with sulfuric acid and with sulfates of ammonium, sodium, iron, and aluminum

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 6, no. 8, 1961, 1808-1812

TEXT: The authors studied the reactions of $ZrOCl_2$ with H_2SO_4 and with sulfates of ammonium, sodium, iron, and aluminum, as well as the formation of basic zirconium salts by the following methods: Sulfates of the elements mentioned were added in rising amounts to zirconium oxychloride solutions of different concentrations. Studies were made at room temperature. The equilibrium between liquid and solid phase was established within 5 - 30 days as dependent on the content of oxychloride in the initial mixture. The reaction of zirconium oxychloride with sulfuric acid and with sulfates of sodium, ammonium, iron, and aluminum in aqueous phase is supposed to proceed in three stages: In the first stage, soluble basic zirconium sulfates are obviously formed which only precipitate at $pH = 1$.

Card 1/3

S/078/61/006/008/004/018
B121/B203

Study of the reaction...

In the second stage (with pH = 1 or more), the zirconium oxysulfates will precipitate. Precipitation of zirconium oxysulfates is possible by two reactions: (a) exchange reaction between sulfates and zirconium oxychloride with formation of zirconium sulfates, (b) precipitation of zirconium oxysulfates from solutions of complex sulfozirconic acids. In the third stage, the precipitates are completely dissolved with a sufficiently high excess of sulfate ions. In solutions of H_2SO_4 , Na_2SO_4 , and $(\text{NH}_4)_2\text{SO}_4$, the dissolution of zirconium oxysulfate increases to a certain value N (N = molar ratio $\text{Me}_2\text{SO}_4 : \text{ZrOCl}_2$), then it slows down again. The dissolution of zirconium oxysulfates increases in iron and aluminum sulfate solutions directly proportional to N. The more concentrated the initial solutions of zirconium oxychloride, the lower are the values of N at which the zirconium oxysulfate dissolves completely. In strongly diluted solutions, hydrolysis prevents the formation of zirconium sulfate complexes. The presence of iron and aluminum ions favors the complex formation of zirconium sulfate. There are 5 figures, 2 tables, and 2 references: 1 Soviet-bloc and 1 non-Soviet-bloc.

Card 2/3

Study of the reaction...

S/078/61/006/008/004/018
B121/B203

ASSOCIATION: Institut obshchey i neorganicheskoy khimii im. N. S. Kurnakova
Akademii nauk SSSR (Institute of General and Inorganic
Chemistry imeni N. S. Kurnakov of the Academy of Sciences
USSR)

SUBMITTED: June 15, 1960

Card 3/3

TANANAYEV, I.V.; SHEVCHENKO, G.V.

Reaction between samarium ions and ethylenediaminetetraacetic acid.
Zhur.neorg.khim. 6 no.8:1909-1913 Ag '61. (MIRA 14:8)
(Samarium) (Acetic acid)

TERESHIN, G.S.; TANANAYEV, I.V.

Solubility product of ethylenediaminetetraacetic acid. Zhur.anal.khim.
16 no.5:523-526 S-O '61. (MIRA 14:9)

1. N.S.Kurnakov Institute of General and Inorganic Chemistry,
Academy of Sciences U.S.S.R., Moscow.
(Acetic acid) (Solubility)

TANANAYEV, I.V.; NIKOLAYEV, N.S.; LUK'YANYCHEV, Yu.A.; OPALOVSKIY, A.A.

Chemistry of uranium fluorides. Usp.khim. 30 no.12:1490-1522
D '61. (MIRA 14:11)

1. Institut obshchey neorganicheskoy khimii imeni N.S.
Kurnakova, AN SSSR.
(Uranium fluoride)

5.5000

27606
S/030/61/000/009/002/013
B105/B101AUTHOR: Tananayev, I. V., Academician

TITLE: Physicochemical analysis in modern chemistry and engineering

PERIODICAL: Akademiya nauk SSSR. Vestnik,³⁾ no. 9, 1961, 32-39

TEXT: A review of progress and trends in the field of physicochemical analysis is made. The following fields are mentioned: study of unstable intermediate reaction products; chemistry of rare elements; metal and salt systems; systems providing the base for high-melting ceramic materials; semiconductors; more accurate definition of phase transitions and their kinetics. Efforts to improve the extraction of small amounts of lithium, rubidium, cesium, boron, etc., using methods of physicochemical analysis are mentioned. A study of the behavior of salt solutions at high temperatures and pressures is especially important against incrustations in high-pressure tanks. N. S. Kurnakov had already recognized the importance of physicochemical analysis. It is of importance also in the theory of turbidimetric analysis when studying complex systems. Gas

Card 1/2

Physicochemical analysis in modern ...

27606
S/030/61/000/009/002/013
B105/B101

systems have remained untouched by physicochemical analysis in spite of their practical importance. According to the author, future trends in the application of physicochemical analysis will include studies of such systems as hydrides, higher oxygen compounds of metals, metal and nonmetal fluorides, ferrites, compounds of elements in abnormal valence states, nitrides, phosphides, monohalogen and elemental-organic compounds. Furthermore, this analysis will play an important role in future research of inorganic macromolecular compounds as a source of new industrial materials which would retain certain properties of organic polymers, such as elasticity at temperatures of 1000°C and above. In conclusion, the author emphasizes the importance of introducing new criteria in physicochemical analysis, e. g., criteria for composition, as illustrated by the series: atoms-simple molecules (monomers)-complex molecules (complex compounds)-macromolecular compounds (polymers)-macrostructural components (monocrystals). There is 1 Soviet reference.

Card 2/2

TANANAYEV, I.V., akademik; DZINURINSKIY, B.F.

Use of spectrophotometry in the study of the composition and structure of complex cobalt chlorides. Dokl. AN SSSR 139 no.1: 120-123 J1 '61. (MIRA 14:7)

1. Institut obshchey i neorganicheskoy khimii im. N.S. Kurnakova AN SSSR.

(Cobalt compounds)

25861
S/020/61/139/004/021/025
B'03/B220

5.2200

AUTHORS: Tananayev, I. V. Academician, Shpirt, M. Ya., and
Sendul'skaya. T. I.

TITLE: Sorption of germanium on aluminum hydroxide

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 139, no. 4, 1961, 907-909

TEXT: The paper deals with test results on sorption of germanium on aluminum hydroxide. Ge was contained in the solution as germanic acid and as HGeO_3 anion. The effect of the following factors was studied: (1) Time of contact between precipitate and solution; (2) temperature; (3) pH of the suspension; and (4) concentration of Ge. The aqueous solutions were prepared with GeO_2 and chemically pure aluminum sulfate. A new gravimetric method for determining semi-microquantities of Ge ($\geq 100\text{mg/l}$) in the solution is suggested based on precipitation of a known quantity of aluminum with ammonia (pH 7 - 8): (a) from a pure solution, and (b) from a solution containing Ge. In both cases, the precipitate is filtered, washed, annealed, and weighed. The increase in weight in case

Card 1/5

Sorption of germanium on aluminum ...

25861
S/020/61/139/004/021/025
B*03/B220

(b) corresponds to the Ge content in the solution sample tested. Tests were made as follows: NH_3 or alkali were added dropwise to the mixture of Ge and Al solutions. The resulting precipitate of aluminum hydroxide sorbed the Ge from the solution. The quantity of coprecipitated Ge was also calculated from the content in the residual solution. The solution as well as the hydroxide after dissolution in 4 N HCl were analyzed according to V. A. Nazarenko & al. (Zav. lab., No. 1, 9 (1958)). The pH was measured by means of an JMM-5 (LP-5) potentiometer. Ad (1) and (2): It was stated that Ge sorption was 99% of the initial amount at a contact time between 5 min and 48 hr, and a temperature between 20 and 80°C (contact time 5 min). All further tests were made at room temperature and a contact time of 24 hr. Ad (3): Maximum sorption occurred with a pH between 6 and 9.6 (precipitation with NH_3). Complete precipitation of aluminum hydroxide was obtained at lower pH values than in case of Ge. First of all, $\text{Al}(\text{OH})_3$ begins to dissolve with increasing alkalinity. At pH=9.6, about 20% of Al was dissolved, whereas Ge was practically not dissolved. Ad (4): At pH=11 (dissolution with NaOH), 70% Al and only

Card 2/5

25861
S/020/61/139/004/021/025
B103/B220

Sorption of germanium on aluminum ...

about 20% Ge were dissolved. Sorption is considered to be a chemical sorption, since the sorption curve deviates from the straight line and shows sharp breaks, and since sorption attains high values (2.67 g Ge per g Al). It is due to the formation of insoluble aluminum germanates. A uniform rise of the curve up to its first break, and the increase of the equilibrium concentration of Ge together with the reduction of the $\text{Al}_2\text{O}_3:\text{GeO}_2$ ratio, are explained by the probable formation of solid solutions of germanates with $\text{Al}(\text{OH})_3$. Therefore, the equilibrium concentration of Ge in the solution depends on the quantity of Ge sorbed on $\text{Al}(\text{OH})_3$, i. e., on the concentration of the germanate in $\text{Al}(\text{OH})_3$. A saturated solid solution is formed in case of a molar ratio $\text{Al}_2\text{O}_3:\text{GeO}_2 \approx 40$ (or 1 g Ge per 30 g Al). A reduction of the above-mentioned ratio results in the solid phase of aluminum germanate. Henceforth, the equilibrium concentration of Ge is not dependent on the ratio mentioned, i. e., on the amount of Ge precipitated. It is determined exclusively by the solubility of the germanate, which amounts to $\sim 0.32 \text{ mg/l GeO}_2$.

Card 3/5

25861

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B103/B220

Sorption of germanium on aluminum ...

This continues as long as the existing Al is sufficient to form the scarcely soluble germanate. A second break in the curve indicates a deficiency of Al in relation to its quantity contained in the germanate. Consequently, the quantity of Ge in the solution begins to increase rapidly in dependence on the decrease of $Al_2O_3 : GeO_2$. Thus, this ratio at the break corresponds to the ratio of the two components in the germanate, which is formed most likely, i. e., 1.5. It is supposed that the further sorption of Ge at a ratio 1.5 may be explained by formation of a better soluble germanate of higher Ge content. The following reaction scheme is suggested: $1.5 Al_2O_3 \cdot GeO_2 \cdot nH_2O + 2H_2GeO_3 \longrightarrow$
 $\rightarrow 1.5 Al_2O_3 \cdot 3GeO_2 \cdot mH_2O + q H_2O$. This reaction is said to be complete merely with a high excess of $GeO_2 (GeO_2 : Al_2O_3 > 3)$ in the solution. If Ge is available in concentrations below 0.3 mg/l, high $Al_2O_3 : GeO_2$ ratios resulting in the formation of solid solutions with low concentration of germanate in $Al(OH)_3$ have to be used for the sorption of Ge from the solution.

Card 4/5

Sorption of germanium on aluminum ...

25861
S/020/61/139/004/021/025
B103/B220

| | | | | | | | |
|------------------------|-----|----|-----|-----|------|------|--------|
| Weight ratio Al : Ge | 1 | 5 | 100 | 200 | 2000 | 5000 | 10 000 |
| Ge concentration, mg/l | 100 | 30 | 10 | 1 | 0.1 | 0.02 | 0.01 |
| Ge precipitation, % | 99 | 99 | 99 | 99 | 96 | 97 | 96 |

It follows that Ge can be precipitated almost completely on aluminum hydroxide (pH 7 - 8; 2% $(\text{NH}_4)_2\text{SO}_4$), even if the Ge concentration is 0.01 mg/l corresponding to $\text{M Al}_2\text{O}_3 : \text{MGeO}_2 \gg 13\ 000$. A better coagulation of the aluminum hydroxide is obtained by adding an electrolyte to the solution. The sorption is practically not affected by salts such as NH_4Cl , $(\text{NH}_4)_2\text{SO}_4$, or NaCl . There are 4 figures and 7 references: 4 Soviet-bloc and 3 non-Soviet-bloc. The reference to the English-language publication reads as follows: K. Kraus (Second United Nations International Conference on the Peaceful Uses of Atomic Energy, A. Conf. 15 (p), 1832, USA, June 1958.)

SUBMITTED: April 25, 1961
Card 5/5

DZHURINSKIY, B.F.; TANANAYEV, I.V., akademik

Spectrophotometric study of the composition and structure of bromide
and iodide complexes of cobalt. Dokl. AN SSSR 140 no.2:374-376
S '61. (MIRA 14:9)

(Cobalt compounds)

UDAL'TSOVA, N.I.; SAVVIN, S.B.; NEMODRUK, A.A.; NOVIKOV, Yu.P.;
DOBROLYUBSKAYA, T.S.; SINYAKOVA, S.I.; BILIMOVICH, G.N.;
SERDYUKOVA, A.S.; BELYAYEV, Yu.I.; YAKOVLEV, Yu.V.;
NEMODRUK, A.A.; CIMUTOVA, M.K.; GUSEV, N.I.; PALEY, P.N.;
VINOGRADOV, A.P., akademik, glav. red.; ALIMARIN, I.P.,
red.; BABKO, A.K., red.; BUSEV, A.I., red.; VAYNSHTEYN, E.Ye.,
red.; YERMAKOV, A.N., red.; KUZNETSOV, V.I., red.; RYABCHIKOV,
D.I., red. toma; TANANAYEV, I.V., red.; CHERNIKHOV, Yu.A., red.;
SENYAVIN, M.M., red. toma; VOLYNETS, M.P., red.; NOVICHKOVA, N.D.,
tekhn. red.; GUS'KOVA, O.M., tekhn. red.

[Analytical chemistry of uranium] Analiticheskaya khimiya urana.
Moskva, Izd-vo Akad.nauk SSSR, 1962. 430 p. (MIRA 15:7)

1. Akademiya nauk SSSR. Institut geokhimii i analiticheskoy
khimii.

(Uranium--Analysis)

34625

S/186/62/004/001/004/008
E075/E436214100
AUTHORS: Deychman, E.N., Tananayev, I.V.

TITLE: Study of plutonium fluorides

PERIODICAL: Radiokhimiya, v.4, no.1, 1962, 66-73

TEXT: The authors investigated plutonium fluoride in view of its interesting chemical properties and, in particular, its solubility in the system $\text{PuF}_4\text{-NaF-H}_2\text{O}$. The separation of a double fluoride of Pu and Na from this system could be expected as for the salts of Pu and K, which would serve as means of precipitation of Pu from the solution. Investigation of the solubility of PuF_4 in NaF solutions was carried out and a solubility diagram constructed consisting of three parts. The first part, up to 0.15% of NaF in solution, corresponds to PuF_4 . From 0.15% NaF onwards there is formation of NaPuF_5 . Confirmation of the identity of this compound came from its solubility curve with the unchanged composition of the solid phase. Solubility of NaPuF_5 reaches the minimum concentration $3 \times 10^{-5}\%$ of Pu. The composition of the compound was established by chemical and optical analysis. The results obtained indicate that the reaction of the complex

Card 1/2 ✓

Study of plutonium fluorides

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E075/E436

formation proceeds as follows: $\text{PuF}_4 + \text{NaF} \longrightarrow \text{NaPuF}_5$. The third part of the diagram, from 0.56% of NaF to 3.5%, corresponds to a coordination saturated compound, the composition of which is Na_2PuF_6 . Optical investigations confirmed the identity of the separated compounds. Both of the double salts are scarcely soluble in the NaF solutions. The authors prove, on the basis of the results obtained, that the solubilities of double salts of Pu and NaF are not greater than those of the double salts of Pu and K, contrary to previous statements. Considering the convenient practical properties of NaF- PuF_4 precipitates, their crystallinity and small volume, and also negligible solubility of Pu in the presence of NaF, the authors conclude that the formation of the double salts can be utilized in analytical practice. There are 7 figures and 3 tables. ✓

SUBMITTED: December 20, 1960

Card 2/3

S/078/62/007/002/015/019
B127/B110

AUTHORS: Tananayev, I. V., Shpirt, M. Ya.

TITLE: Sorption of germanium by Al_2O_3 , Fe_2O_3 , and MgO from aqueous solutions of its dioxide

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 7, no. 2, 1962, 434 - 435

TEXT: The sorptive properties of Al_2O_3 (specific surface $31.7 \text{ m}^2/\text{g}$), Fe_2O_3 ($86 \text{ m}^2/\text{g}$), and MgO ($21.8 \text{ m}^2/\text{g}$) with respect to GeO_2 were studied. The pH of the aqueous solution did not change during sorption and desorption: Fe_2O_3 : pH = 7.6; Al_2O_3 : pH = 7.8, the more alkaline the solution, the higher the rate of sorption which was faster with Fe than with Al. The sorptive power of Fe_2O_3 decreased rapidly in the presence of citric, oxalic and tartaric acids and their salts, or sodium sulfide. 100 g of MgO adsorbed 9.75 g of Ge at a GeO_2 concentration of 2 mg/liter, and did not change its sorptive properties in different solutions. With

Card 1/2

Sorption of germanium by Al_2O_3 ,...

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B127/B110

this concentration, the sorption of Fe_2O_3 was only 1.6 g, that of Al_2O_3 was 0.16 g per 100 g of sorbent. A decrease in the sorptive power of Fe and Al with a pH reduction is explained by the separation of Ge as an anion of germanic acid. A decrease in pH reduces the anion concentration considerably. With Fe_2O_3 , citric, oxalic, and tartaric acids only inhibit sorption owing to complex formation, whereas Na_2S has a poisoning effect due to FeS formation. Greater sorptive power of MgO as compared to that of Fe_2O_3 , is assumed to be due to its higher solubility: dissolved Mg^{2+} form insoluble germanates. Thus, sorption is not restricted to the surface, as it is with Fe_2O_3 . There are 2 figures and 2 Soviet references.

SUBMITTED: July 11, 1961

Card 2/2

TANANAYEV, I.V.

"Chemistry and technology of uranium fluorides" by N.P.Galkin and
others. Reviewed by I.V.Tananaev. Zhur.neorg.khim. 7 no.2:447-
448 F '62. (MIRA 15:3)
(Uranium fluorides) (Galkin, N.P.)

IONOVA, Ye.A.; TANANAYEV, I.V.

Interaction of zirconyl chloride with alkali metal ferrocyanides
in acidic medium. Zhur.neorg.khim. 7 no.4:791-794 Ap '62.
(MIRA 15:4)

(Zirconyl chloride) (Ferrocyanides)

TANANAYEV, I.V.; SHPIRT, M.Ya.

Coprecipitation of germanium with hydroxides of trivalent metals.
Zhur.neorg.khim. 7 no.5:1174-1181 My '62. (MIRA 15:7)
(Germanium) (Hydroxides) (Precipitation (Chemistry))

TAMANAYEV, I.V.; KACHUKHASHVILI, S.I.

Reaction between silver nitrate and alkali metal ferrocyanides.
Zhur.neorg.khim. 7 no.7:1516-1520 JI '62. (MIRA 16:3)
(Silver nitrate) (Alkali metal ferrocyanides)

TANANAYEV, I.V.; GALKIN, N.P.; SAVCHENKO, G.S.; SUTYAGIN, V.M.

Interaction of UCl_4 and $U(SO_4)_2$ with NaF in aqueous solutions. Zhur.
neorg.khim. 7 no. 7:1675-1680, 1962. (MIRA 16.3)
(Uranium chloride) (Uranium sulfate) (Sodium fluoride)

TANANAYEV, I.V.; ROZANOV, I.A.

Thiocyanate compounds of zirconium. Zhur. neorg. khim. 7
no.8:1854-1859 Ag '62. (MIRA 16:6)

(Zirconium compounds) (Thiocyanates)

TANANAYEV, I.V.; ORLOVSKIY, V.P.

Synthesis of complex compounds of scandium chloride and
bromide with some organic amines. Zhur. neorg. khim. 7 no.8:
2022-2023 Ag '62. (MIRA 16:6)

(Scandium compounds) (Amines)